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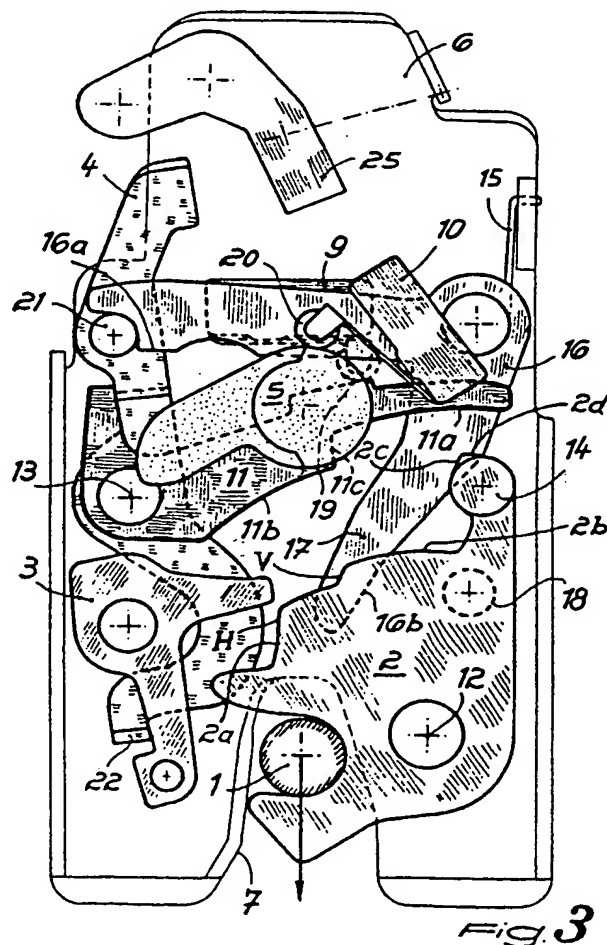
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(54) Motor vehicle door lock

(57) A motor vehicle door lock has a catch (3) engaging "half lock" (V) and "full lock" (H) settings on a bolt (2) actuated by a striker (1) fixed to the vehicle, an actuating lever (4) for the catch and an electric motor driven cam (5) engaging the bolt (2) and the actuating lever (4). A two-armed switching lever (11) loaded by a spring and swivelling about an axle (13) parallel to the axle (12) of the bolt (2) one arm having a face cam (11a, 11b, 11c) engaging a control element (14) of the bolt (2) and the other arm engaging the actuating lever (4), and a blocking lever (16) loaded by a spring (15) to engage a formation (21) after this formation has been engaged by the cam (5) whereby the actuating lever (4) can be blocked when the actuating lever (4) has been urged into the opening setting by the cam but the bolt (2) is held fast by the striker (1) (as shown). The blocking lever (16) is controllable through engagement of one arm (16b) by an element (18) on the bolt (2) so as to release the actuating lever (4), a limit switch (9) for the "start motor" setting is actuated by the switching lever (11) and a limit switch (10) for the "stop motor" setting is actuated by the cam (5).



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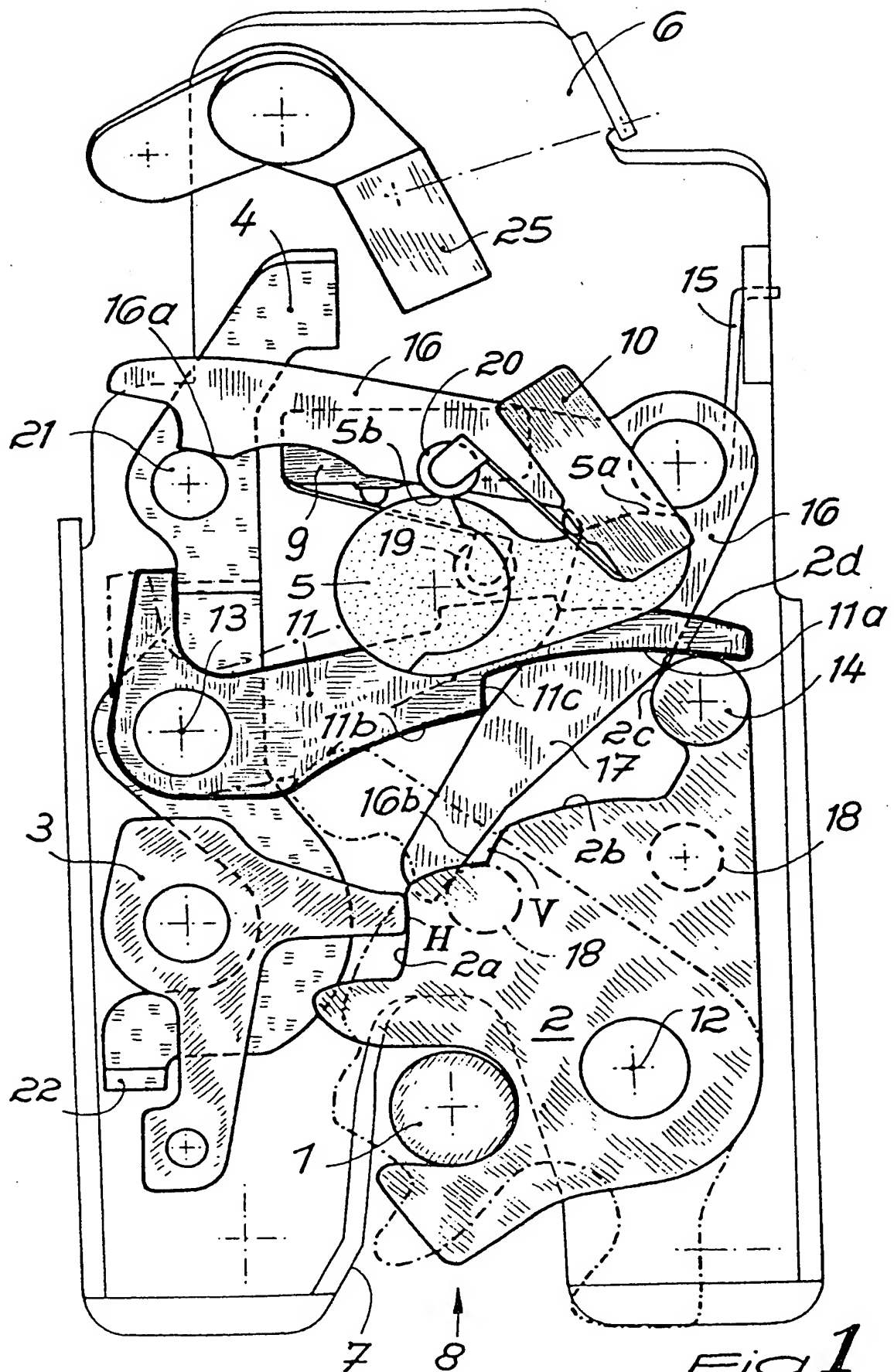
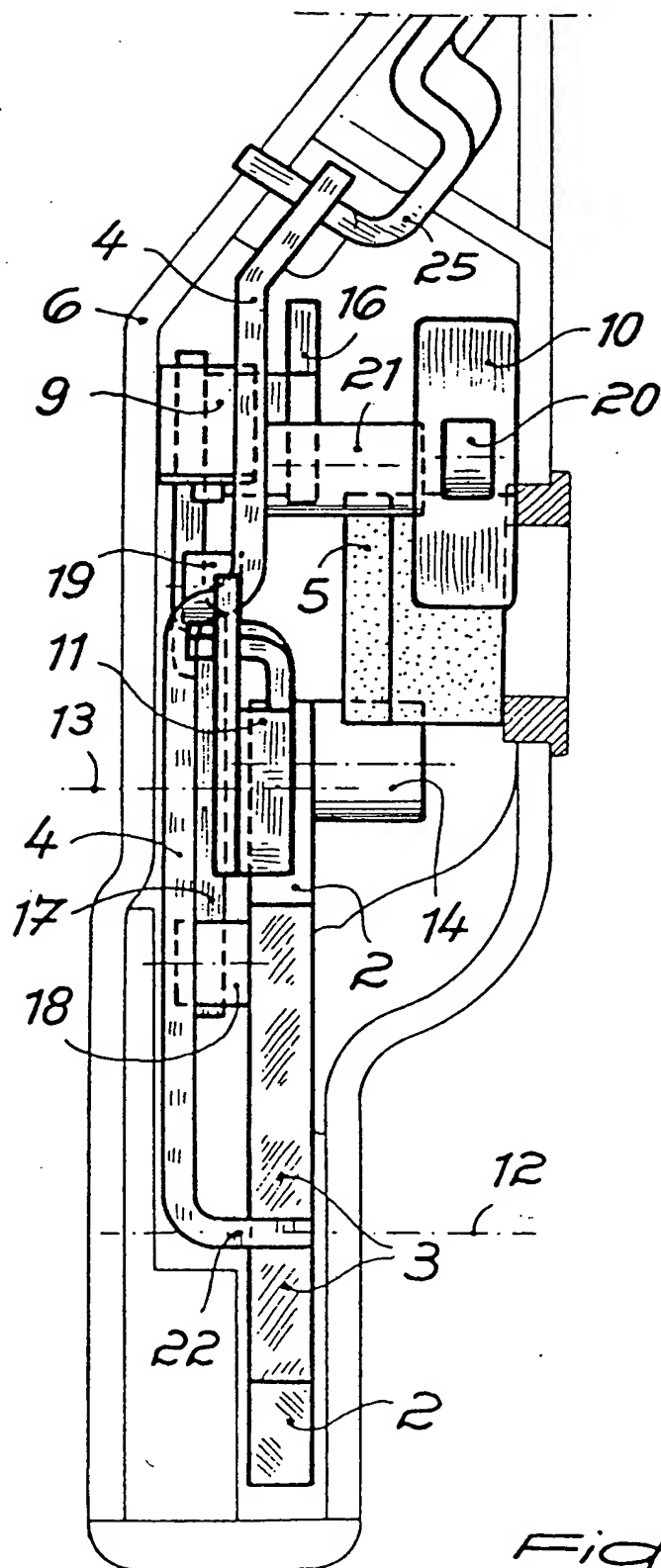


Fig. 1



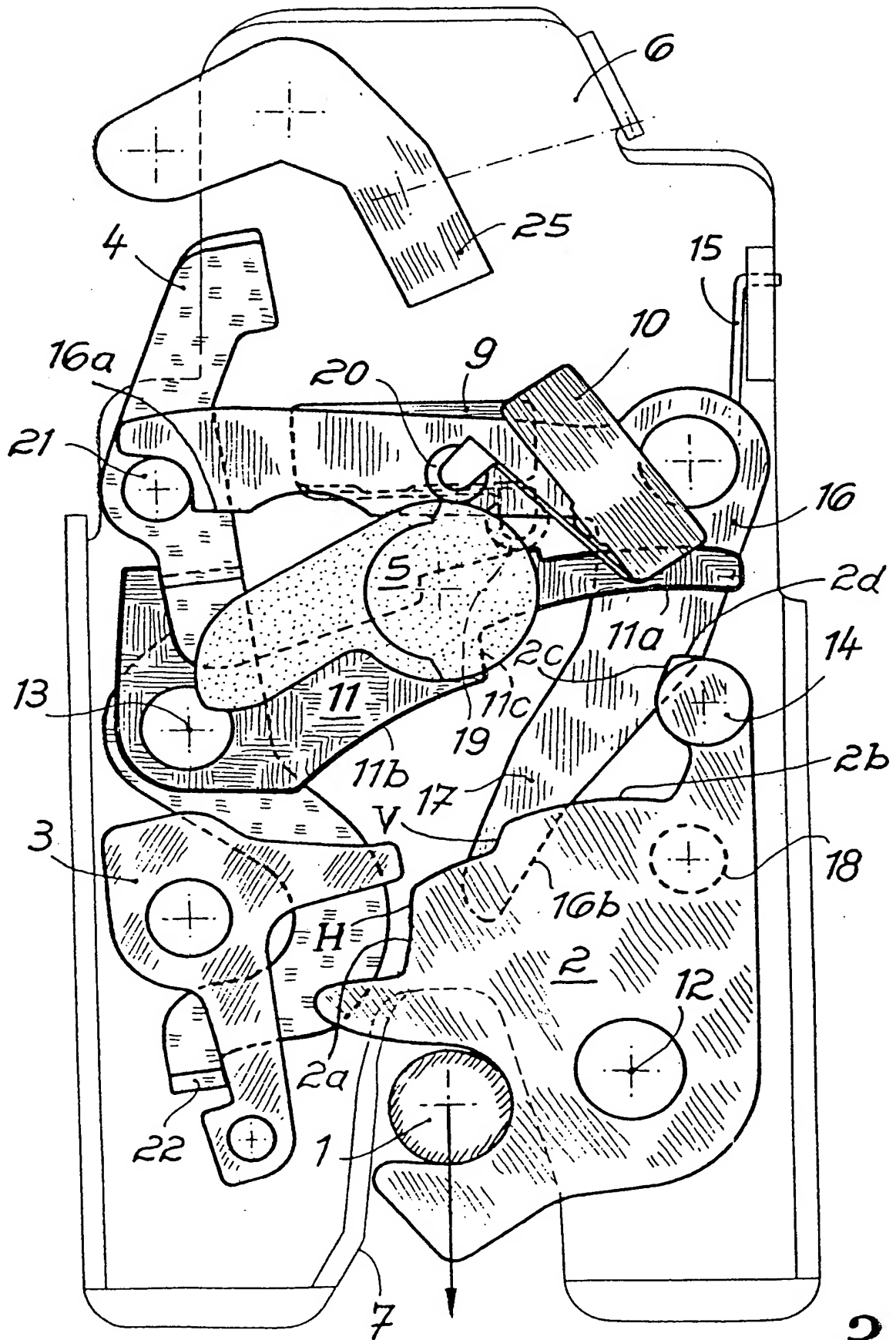


Fig. 3

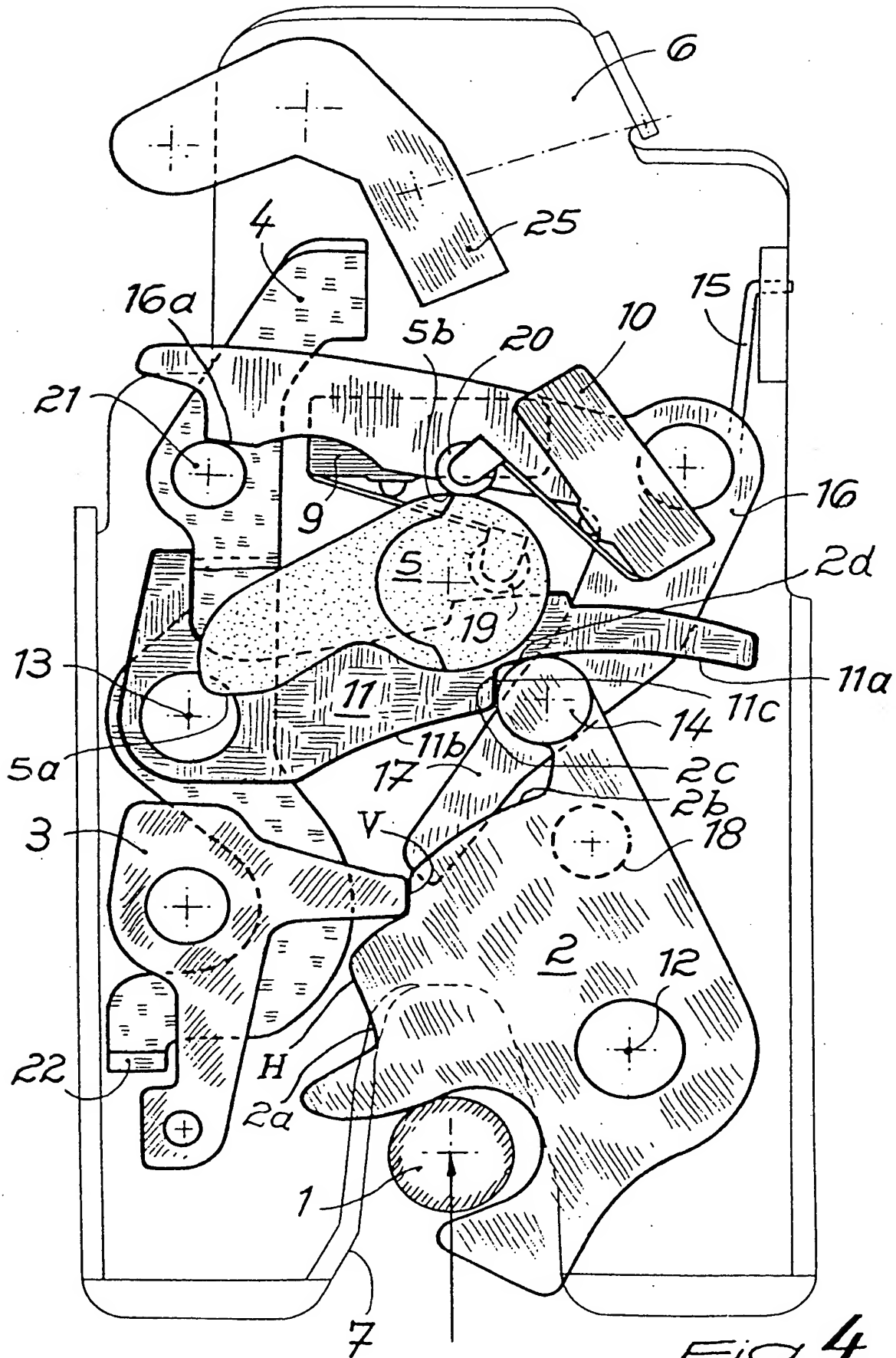


Fig. 4

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SPECIFICATION

Motor vehicle door lock with "half lock" and "full lock" settings and electric motor control

This invention relates to a motor vehicle door lock equipped with a catch having "half lock" and "full lock" settings on a swivel latch actuated by a closure bolt fixed to the vehicle, an actuating lever for the catch, and an electric motor for driving a cam for electrical control of the swivel latch and of the actuating lever between "door lock releasable" and "door lock locked" settings; an operating switch in the interior of the motor vehicle and/or in a door, together with limit switches built into the door lock, one for a "start motor" setting and another for a "stop motor" setting, and at least one of the limit switches being actuable according to the setting of the swivel latch. Motor vehicle door locks of this type are used more particularly on vehicle hatch doors or boot lids.

In a known motor vehicle door lock of the type described, the limit switch for the "start motor" setting is attached directly to the swivel latch and actuated directly by the swivel latch. The arrangement in this case is such that the swivel latch is driven by the electric motor over the greatest possible distance. Accordingly, this limit switch is located for actuation at the "half lock" setting of the motor vehicle door lock. This is not without its disadvantages. There is a risk that if a door or boot lid fitted with the motor vehicle door lock as described is closed gently, this limit switch will be touched but the door or boot lid will rebound, so that the catch never reaches the "half lock" setting on the swivel latch, the motor vehicle door or boot lid springs back open and yet the motor vehicle door lock is electrically fully closed.

The object of the invention is to improve a motor vehicle door lock of the type initially described so that operation by electrical control of the motor vehicle door lock to locked position cannot take place when the motor vehicle door or the boot lid is momentarily closed but then rebounds.

According to the present invention, there is also provided in the vicinity of the cam a two-armed switching lever loaded by a spring and swivelling about an axle parallel to the axle of the swivel latch, one arm of the switching lever having a face cam engaging a control element on the swivel latch and the other arm engaging the actuating lever, and a blocking lever loaded by a spring whereby the actuating lever has been urged into the opening setting but the swivel latch is held fast by the bolt (when, for example, the door or boot lid is stuck), the blocking lever being controllable through engagement of one arm by an ele-

ment on the swivel latch so as to release the actuating lever upon movement of the swivel latch to open position, the limit switch for the "start motor" setting being actuated by the switching lever and the limit switch for the "stop motor" setting being actuated by the cam.

An embodiment of a motor vehicle door lock in accordance with the invention will now be described, by way of example only, together with a description of its functions and the accruing advantages, with reference to the accompanying drawings, in which:-

Figure 1 is a front elevation of a motor vehicle door lock in accordance with the invention showing the significant components in the "door lock locked" setting;

Figure 2 is an elevation from the left hand side of Fig. 1;

Figure 3 shows the lock of Fig. 1 in the "door lock released" setting; and

Figure 4 shows the lock of Fig. 1 in the "half lock" setting.

The motor vehicle door lock shown in the drawings comprises a swivel latch 2 actuated by a closure bolt 1 fixed to the vehicle, a catch 3, an actuating lever 4 for the catch 3, and a system having an electric motor (not shown) and a cam 5 for electrical control of the swivel latch 2 and the actuating lever 4, and it is equipped with a "half lock" setting, and a "full lock" setting, the catch 3 lying at V on the swivel latch 2 at "half lock" and at H at "full lock". It is self evident that the said components are mounted in a lock plate or housing 6. This lock plate or housing 6 has a recess 7 for the insertion of the closure bolt 1, which is inserted relatively in the direction of the arrow 8 in Fig. 1, since the drawing shows a motor vehicle door lock for a boot lid. The electric motor drives the aforesaid cam 5. The actuating lever 4 can be moved between "door lock locked" and "door lock released" settings. Fig. 1 depicts the door lock locked in the "full lock" setting, and Fig. 3 depicts it in the "door lock releasable" setting, while Fig. 4 shows it locked in the "half lock" setting.

The electrical control for the swivel latch 2 and the actuating lever 4 has an operating switch (not shown) in the interior of the motor vehicle or in a motor vehicle door, together with limit switches 9, 10 built into the door lock, the switch 9 being for a "start motor" setting and the switch 10 being for a "stop motor" setting. One of the limit switches 9, 10 is actuable according to the setting of the swivel latch 2, as will be described further below.

In the vicinity of the cam 5 there is swivelably disposed a two-armed switching lever 11 loaded clockwise by a spring (not shown) and swivelling about an axle 13 parallel to the swivel latch axle 12. One arm of the switching lever 11 has cam faces 11a, 11b, 11c engaging a control element 14 on the swivel

latch 2 and the other arm engages the actuating lever 4. A blocking lever 16 is loaded anti-clockwise by a spring 15 whereby the actuating lever 4 can be blocked when, as shown in Fig. 3, the actuating lever 4 has been urged into the opening setting but the swivel latch 2 is held fast by the bolt 1, when—for example—the boot lid is stuck with ice. The blocking lever 16 is controllable through engagement of one arm 17 by an element 18 on the swivel latch 2 so as to release the actuating lever 4 upon movement of the swivel latch 2 to open position. The limit switch 9 for the "start motor" setting is actuated by the switching lever 11 moving anti-clockwise, and the limit switch 10 for the "stop motor" setting is actuated by the cam 5.

As mentioned previously, Figs. 1 and 2 show the swivel latch 2 and the catch 3 in the "full lock" setting. The cam face 11a on the switching lever 11 lies on the radiused face 2d of the control element 14 of the swivel latch 2. The limit switch 10 is in contact through its actuating roller 20 with the larger diameter switching flank 5b of the cam 5 and is actuated. This means that the electric motor is stopped. The face 16a of the blocking lever 16 lies on the spindle 21 of the actuating lever 4. The actuating lever 4 itself is in an idle position.

In Fig. 3 the actuating face 5a on the cam 5, acting through the spindle 21, has urged the actuating lever 4 into the release setting, and the crank 22 of this actuating lever 4 has lifted the catch 3 clear of the "full lock" face 2a of the swivel latch 2. This has all been brought about by suitably manipulating the operating switch in the interior of the motor vehicle. Now if (as shown in Fig. 3) the swivel latch 2 remains in the closed setting, because in the case of a boot lid for example the boot lid has frozen solid on its sealing rubber, the blocking lever 16 will be urged behind the actuating lever spindle 21 by the force of its spring. It as it were conserves the release setting of the actuating lever 4 and hence of the catch 3. If subsequently the swivel latch 2 moves into the open setting (shown in broken line in Fig. 1) because for example the boot lid is forced up, the element 18 formed by a shoulder pin on the swivel latch 2, acting through the face 16b, urges the blocking lever 16 out of its blocking setting, and the actuating lever 4 returns to its idle setting. The catch 3 lies ready for engagement with the face 2b of the swivel latch 2.

Turning now to Fig. 4, the following will be seen: When the swivel latch 2 is urged in the direction of the locked setting by the bolt 1, the face 2d of the swivel latch 2 slides along the face 11b of the switching lever 11 until the switching lever 11 drops and the face 11c engages the face 2c of the swivel latch, when the catch 3 can drop into the "half lock"

setting V on the swivel latch 2. At the same time, the roller 19 of the limit switch 9 can move down and the switch 9 is actuated. It makes the electric motor start. The face 5a of the cam 5, acting through the control element 14, urges the swivel latch 2 into the fully closed position, and the catch 3 drops into the "full lock" setting H on the swivel latch 2. The limit switch 10, actuated by the switching flank 5b of the cam 5 now switches the electric motor off.

The lever 25 provides for emergency manual release, effected by rotation of the lever 25 by hand or a key to engage and swivel the actuating lever 4.

CLAIMS

1. A motor vehicle door lock equipped with a catch having a "half lock" and "full lock" settings on a swivel latch actuated by a closure bolt fixed to the vehicle, an actuating lever for the catch, an electric motor for driving a cam for electrical control of the swivel latch and of the actuating lever between "door lock releasable" and "door lock locked" settings, and an operating switch in the interior of the motor vehicle and/or in a door, together with limit switches built into the door lock, one for a "start motor" setting and another for a "stop motor" setting, and at least one of the limit switches being actuable according to the setting of the swivel latch, and within the vicinity of the cam a two-armed switching lever loaded by a spring and swivelling about an axle parallel to the axle of the swivel latch, one arm of the switching lever having a face cam engaging a control element on the swivel latch and the other arm engaging the actuating lever, a blocking lever loaded by a spring also being provided, whereby the actuating lever can be blocked when the actuating lever has been urged into the opening setting but the swivel latch is held fast by the bolt, the blocking lever being controllable through engagement of one arm by an element on the swivel latch so as to release the actuating lever upon movement of the swivel latch to open position the limit switch for the "start motor" setting being actuated by the switching lever and the limit switch for the "stop motor" setting being actuated by the cam.

2. A motor vehicle door lock substantially as hereinbefore described with reference to the accompanying drawings.